CALCULUS.

207. Proposed by F. P. MATZ, Sc. D., Ph. D.

If K represents the complete elliptic integral of the first kind, prove that

$$\int_0^1 \frac{K d\kappa}{1+\kappa} = \tfrac{1}{4}\pi^2.$$

208. Proposed by F. P. MATZ, Sc. D., Ph. D.

Solve the differential equation

$$(a^2+x^2)\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = 0.$$

MECHANICS.

185. Proposed by J. EDWARD SANDERS.

A perfectly flexible rope whose weight is w per linear unit, and length $2l$, rests in equilibrium on a smooth peg. If now one end be raised a distance a and then released, find the time in which this end will rise to the height x above its original position, and the tension at that instant of the rope at the point where it passes over the peg.

MISCELLANEOUS.

152. Proposed by J. EDWARD SANDERS.

A conductor, the equation of the surface of which is

$$\frac{x^2}{25} + \frac{y^2}{16} + \frac{z^2}{9} = 1,$$

is charged with 80 units of electricity, what is the density at a point for which $x=3$, $y=3$? If the density of this point be a, what is the whole charge on the ellipsoid? [From Peirce's *Potential Functions*, example 165, p. 388.]

153. Proposed by CHRISTIAN HORNUNG, A. M., Heidelberg University, Tiffin, Ohio.

Two men start from Columbus, Ohio, at the same time; one travels east and the other west. They travel at the rate of 4 miles an hour from sunrise to sunset each day until they meet. Where will they meet and what distance will each have traveled?

154. Proposed by D. BIDDLE (Unsolved problem in the Educational Times, London).

Prove that the proper angle at which to cross a street when a person wishes to continue his course on the other side, and the roadway is n times as muddy as the pavement, is that of which the sine is $(n^2-1)/(n^2+1)$.